

Appl. No. 09/832,980
Amdt. dated 7 December 2005
Reply to Office action of September 7, 2005
Atty. Docket No. AP1103US

REMARKS/ARGUMENTS

Claims 4, 5 and 19 - 38 are pending in the application and were rejected in the Office Action mailed September 7, 2005, which was made FINAL. It is respectfully requested that the finality of the Office Action be rescinded and the foregoing amendments entered, for reasons set out below.

In the Office Action, the examiner objected to claim 21 in view of an informality, namely the use of the word "voice" in the second line of clause (ii) of the claim. It is noted that this clerical error was pointed out to the examiner, and corrected, in the Supplemental Amendment submitted by facsimile on May 30, 2005. The same Amendment corrected an antecedent issue in claim 26. A copy of the Auto-Reply Facsimile Transmission, confirming receipt of the Supplemental Amendment by the USPTO, is appended to this response. It is submitted, therefore, that the objection is moot.

In paragraph 3 of the Office Action, the examiner rejected claims 4, 5 and 19 - 38 under 35 U.S.C. 112 as indefinite because "The newly added subject matter 'voice and data return loss circuit' to independent claims 19, 21, 23, 29, 31, and 33 that (*sic*) not clearly disclose (*sic*) in the original specification." With respect, the phrase "voice and data return loss circuit" does not appear in those claims. It is presumed that the examiner intended to refer to the phrase "far end echo cancellation means" which appears in some of those claims (i.e., claims 19, 21 and 23) and was the subject of the telephone conversation to which the examiner referred.

During that telephone conversation, the undersigned accepted that the exact phrase "far end echo cancellation means" did not appear explicitly in the original disclosure, but pointed out that it would have been obvious to the skilled addressee that the term referred to the voice and data band return loss circuits 114 and 117, respectively, their associated voice band and data band filters 113 and 116 and the combiner 108. The phrase was merely introduced, for greater clarity, to qualify the means-plus-function clause referring to the functions performed by those elements and to differentiate more clearly from the near end echo cancellation means in later claims.

A skilled person would know what the return loss circuits did, especially in view of the repeated references to far end echo cancellation in the specification. The skilled person would also appreciate that, in the schematic drawing, blocks 106-116-115-108-105-103 are the signal path for DSL line equalization; blocks 106-120 are for retrieving DSL signals from the phone line; blocks 124-118-119-126 are for DSL hybrid cancellation; and blocks 124-111-108-105-101-131/132 are for putting the DSL signal on to the phone line.

The undersigned understood that the examiner would examine the claims on the basis that the adjectival phrase "far end echo cancellation" would be deleted or, should the examiner prefer, be replaced by a reference to the return loss circuits and associated filters. The undersigned did not submit confirmation of the interview because the examiner stated that he would include it in the next

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Office Action.

The foregoing amendments implement what the undersigned understood had been agreed during the interview, i.e., the phrase "far end echo cancellation" has been deleted from claims 19, 21 and 23. For the same reasons, the corresponding phrases in "cancelling far end echo by" have been deleted from corresponding method claims 29, 31 and 33.

In the course of reviewing the dependent claims for antecedent problems resulting from such deletion, it was noted that there were erroneous references to "near echo" and, in some cases "near echo cancellation" in claims 20, 22, 24, 30, 32 and 34. These errors have been corrected. Other clarifications have been made, which are considered to be self-explanatory. The most significant is the substitution of the name "subscriber line interface circuit (SLIC)" instead of the phrase "termination circuit for a subscriber line interface". Also, it is apparent from the drawing that the analog filter is not *in* the return loss circuit but merely filters it output, the return loss signal. The amendments to paragraph [0008] to [0012] are for consistency with the amended claims. The amendments to paragraphs [0015] and [0016] and the intervening caption make it clear that the following section is a "detailed description of a preferred embodiment" of the invention, according to proper US practice.

In paragraph 5 of the Office Action, the examiner noted that the application named joint inventors, and stated that he presumed that the subject matter of the claims was commonly owned. The presumption is correct.

In paragraph 6 of the Office Action, the examiner rejected claims 4, 5, 19, 20, 23 - 30 and 33 - 38 under 35 U.S.C. § 103(a) as unpatentable over US 6,212,259 (Kiko) in view of US 6,694,019 (Song) and further in view of US published application No. 2005/0031097 (Rabenko *et al.*) In paragraph 7 of the Office Action, the examiner rejected claims 21, 22, 31 and 32 under 35 U.S.C. § 103(a) as unpatentable over US 6,212,259 (Kiko) in view of US published application No. 2005/0031097 (Rabenko *et al.*) and further in view of US 6,694,019 (Song). It is noted that this is the same combination of references, but in a different order. Both rejections are respectfully traversed on the grounds that the cited documents do not contain anything to motivate the skilled addressee to combine them and certainly no instructions to combine them in such a way that the present invention, as claimed, would result. (c.f. cases cited in MPEP 2143.01).

The present invention is directed to a subscriber line interface circuit for *both* voice and data (DSL) signals and addresses the echo problem by filtering *within the SLIC itself*. Previously, the voice port and DSL modem were two separate devices, and were connected together via a transformer and frequency splitters (filter) at a so-called POTS splitter. Filtering is needed to separate the voice and DSL bands so that they do not affect each other. The requirement in the central office for filtering is more severe than at the subscriber side, so a higher order (number of

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poles) filter is needed. Consequently, the frequency splitters are bulky and expensive. An object of the present invention is to reduce such costs.

The solution taught by the present inventors is *a subscriber loop interface circuit (SLIC) which could propagate both voice signals and data signals and has filtering in it to ensure that the voice signals do not affect the data signals.*

The analog filters employed in embodiments of the present invention perform the same function as the external filters but within the SLIC. At the same time, the SLIC may provide line equalization for both voice and DSL data. The filter is needed to split the voice and DSL band before such line equalization can be carried out, also within the SLIC.

An advantage of using SLICs embodying the present invention is that, when a subscriber requests a DSL line, it is not necessary for a technician to transfer the subscriber's connections physically to a splitter. Consequently, significant labour costs are saved.

To the best of the inventors' knowledge, such a SLIC, which could propagate both voice and data signals without needing external filters, *was not known at the effective date.* It is noted that the present application claims priority from a British application filed April 25, 2000.

The solution taught by the present invention is very simple and, because they are analog, the return loss circuits and associated filters could be fabricated in the same silicon as the other components of the SLIC.

Although it was implicit that the claims were directed to analog circuitry, since the examiner appears to have construed the claims as embracing digital solutions, each independent claim has been amended to state explicitly that the filtering is done by means of analog filters.

Nothing in the disclosures by Kiko, Song and Rabenko would motivate the skilled person to combine voice and data in the same subscriber loop interface circuit (SLIC) and to solve the echo cancellation problem by means of analog filters built into the subscriber line interface circuit itself.

Kiko was discussed at length in the previous response and the examiner is invited to review the discussion. It is noted, however, that Kiko discloses a blocking filter that is used at the customer premises equipment; hence there is no suggestion of incorporating it into a subscriber line interface circuit (SLIC). Also, it is noted that the telephone and data ports are not *both* connected physically to the TIP and RING.

Song discloses a circuit for temporarily halting or bypassing operations of an echo canceller if an infinite return loss (IRL) condition is detected. This has no relevance to the present invention. Also, Song's echo canceller is for mitigating acoustic echo (Col. 3, lines 13 - 28) and is implemented digitally (Col. 4, lines 12 to 27). In fact, Song discloses the kind of digital circuit discussed on page 2, lines 8 to 14 of the present applicants' original specification, where it is stated that "In a voice only system, ... the transhybrid loss circuit function can be performed digitally without much compromise on the dynamic range of the analog to digital converter. This can be a large problem in a system

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which has a high frequency data signal, since the transmit fraction of the incoming signal is much larger than the receive component of the incoming signal." Rabenko neither discloses nor suggests a SLIC capable of handling voice and data with an internal analog filter to prevent interference between them.

It follows that a skilled addressee faced with the problem addressed by the present invention, namely reducing costs associated with transformers and splitters for each line and labour costs for changing connections to provide DSL service, would *not* be motivated to combine Song's circuit with those disclosed by Kiko and Rabenko, even if he did so, he would not arrive at the present invention, which entails a SLIC which propagates voice and data signals and deals with echo in the subscriber loop (carrying both voice and data signals), by means of an integral filter, thus obviating the need for external filters (splitters).

Accordingly, it is submitted that all of the claims are record are patentable over the cited references, whether taken individually or in combination.

Since the rejections under 35 U.S.C. § 112 resulted from a misunderstanding during the telephone interview, and the foregoing amendments put the application into condition for allowance, it is respectfully requested that the finality of the Office Action be rescinded and the amendments entered.

If the examiner has any further concerns, however, he is invited to call the undersigned at (613) 254 9111.

Respectfully submitted,

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Date


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